

Solid State Non-powder Process for Boron Nitride Nanotube Metal Matrix Composite, Phase I

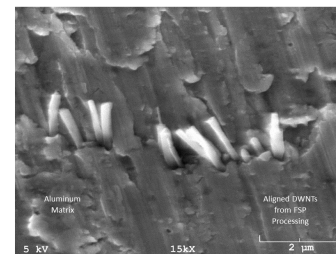
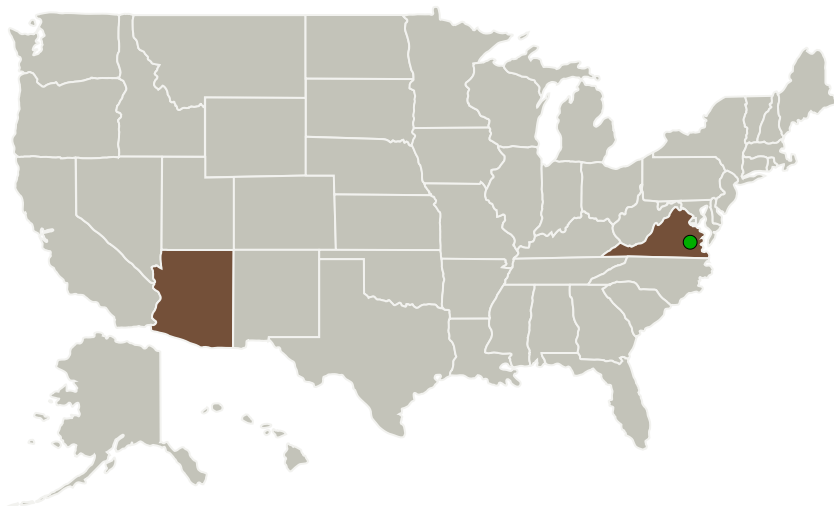
Completed Technology Project (2017 - 2017)



Project Introduction

Boron nitride nanotube (BNNT) reinforced metal matrix composites (MMCs) provide potential for advanced lightweight high stiffness structures that are critical for virtually all NASA space missions. State of the art powder metallurgy and fusion processing to produce BNNT MMC have resulted in disappointing results that in part relate to poor dispersion of the BNNTs, poor interface bonding and high porosities in the MMC. A new breakthrough method of producing nanotube MMCs consists of friction stir processing (FSP) which is a solid state/non-melt process that produces pore/defect-free MMCs with excellent metal matrix interface bond. The FSP process produces aligned nanotube MMCs with substantially enhanced mechanical properties. BNNTs shall be processed to produce alignment and coupled with the FSP additive manufacturing process (FSAM) that demonstrates enhanced properties over monolithic light metals of magnesium, aluminum and titanium. Samples shall be produced that verify enhanced properties, FSAM shall demonstrate producing example parts with an economic model generated for application to NASA structures.

Primary U.S. Work Locations and Key Partners



Solid State Non-powder Process for Boron Nitride Nanotube Metal Matrix Composite, Phase I Briefing Chart Image

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

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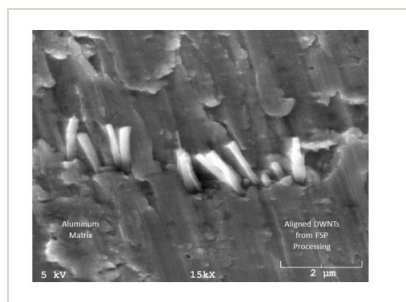


Organizations Performing Work	Role	Type	Location
ATS-MER, LLC	Lead Organization	Industry	Tucson, Arizona
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Arizona	Virginia
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Images



Briefing Chart Image

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(<https://techport.nasa.gov/image/133129>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

ATS-MER, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

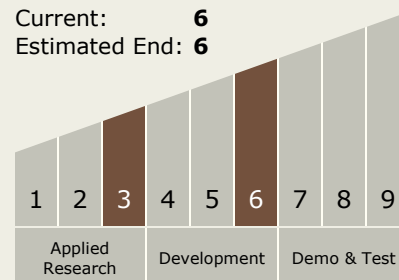
Carlos Torrez

Principal Investigator:

James Withers

Technology Maturity (TRL)

Start: 3
Current: 6
Estimated End: 6



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.1 Manufacturing Processes

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System